REMARKS

Claims 1-2, 4-5, and 8-17 are pending. Claims 3, 6, and 7 were previously cancelled. Claims 1 , 4, 8, 13, and 15 are currently amended. Claim 18 has been added. Claims 2 and 9-12 are cancelled herein without prejudice. Applicant reserves the right to pursue the cancelled matter in a continuation application. Applicants submit that no new matter has been added as a result of this amendment; support therefor can be found throughout the specification and original claims. For example, support for amended claim 1 can be found in paragraphs 20 and 134 as published (paragraph bridging page 4-5 and third paragraph on page 20 of the specification as filed). Claim 13 is amended to correct an obvious typographical error. Newly added claim 18 is supported, for example, by the sequence listing and Figure 9.

Claim Objections

The Examiner has objected to claims 1, 4, 8, and 15 for containing informalities. Applicant thanks the Examiner for the careful reading of the claims. Claims 1, 4 and 15 have been amended per the suggestion of the Examiner. The amendments to correct formalities do not alter the scope of the claims. Claim 1 has been amended and now provides proper antecedent basis for claim 8. Withdrawal of the objections is respectfully requested.

Claim Rejections

Rejection of Claims 1-2, 4-5, and 8-16 under 35 U.S.C. §112, first paragraph

Enablement

The Office Action has rejected claims 1-2, 4-5, and 8-16 under 35 U.S.C. §112, 1st paragraph. The Office Action alleges that the specification, "while being enabling for modified yeast FRE1 coding sequence as defined in SEQ ID NO: 1…does not reasonably provide enablement for the scope of possible gene sequences from any species claimed for use in plants." (Office Action, p.5). Applicant respectfully

disagrees. However, to progress the prosecution of the application, Applicant has amended claim 1 to include the limitations of claims 10-12 to recite that the "heterologous nucleic acid comprises a nucleic acid encoding a ferric-chelate reductase FRE1 from yeast." Newly added claims 18 recites that the nucleic acid encodes "an amino acid sequence comprising SEQ ID NO: 1." It is noted that SEQ ID NO: 1 provides both a nucleotide sequence and an amino acid sequence, and that any of a number of predictable nucleotide sequences could encode as demonstrated by the references cited by the Examiner in the instant Office Action.

Applicant accordingly requests that the rejection be reconsidered and withdrawn.

Written Description

The Office Action has rejected claims 1-2, 4-5, and 8-16 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. The Examiner argues that "the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention." (Office Action, p. 8). However, the Office Action states that "[t]he specification as filed describes modifications of yeast FRE1, as set forth in SEQ ID NO: 1 for use in plants."

Without agreeing with the rejection and purely to progress the prosecution of the application, Application, Applicant has amended claim 1 to include all of the limitations of claims 10-12 to recite that the "heterologous nucleic acid comprises a nucleic acid encoding a ferric-chelate reductase FRE1 from yeast." Newly added claims 18 recites that the nucleic acid encodes "an amino acid sequence comprising SEQ ID NO: 1." It is noted that SEQ ID NO: 1 provides both a nucleotide sequence and an amino acid sequence, and that any of a number of predictable nucleotide sequences could encode as demonstrated by the references cited by the Examiner in the instant Office Action.

Applicant respectfully requests reconsideration and withdrawal of the rejection.

New Matter

The Office Action has rejected claims 1-2, 4-5, and 8-16 for containing new matter. Specifically, the Office Action alleges that the phrase "8 or more consecutive G and/or T nucleotides" is new matter. Applicant respectfully disagree.

However, purely to progress the prosecution of the instant application, Applicant has amended claim 1 to recite that "GT rich regions comprising 8 or more consecutive bases of G or T" which is supported by the specification as noted below. Applicant points to paragraph 134 of the instant specification reproduced below:

> [0134] The present invention provides a method for designing base sequence for obtaining full length transcriptional product by transferring gene of different species in the higher plant. In the method of the present invention, in order to avoid addition of poly(A) in the coding region, it was found that it is necessary to design the sequence consisting of continued base sequence of 8 bases or more without containing sequence consisting of only G or T, and to design the sequence without containing not only a sequence of AATAAA but also a sequence, in which any one of bases thereof is replaced by another base (i.e. NATAAA, ANTAAA, AANAAA, AATNAA, AATANA, or AATAAN). [emphasis added]

Per section 2163.02 of the MPEP, "The subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement." Applicant submits that one of skill in the art would have understood the inventor to be in possession of the subject matter claimed at the time of filing. Withdrawal of the rejection is respectfully requested. However, if the Examiner will not withdraw the rejection, Applicant request that the Examiner provide language that may be acceptable and be considered to be supported by the specification to communicate the concept clearly set forth in the specification.

The Office Action has rejected claim 9 for including new matter. Applicant respectfully disagrees. However, to progress the prosecution of the instant application, Applicant has cancelled claim 9.

Withdrawal of the rejection is respectfully requested.

Rejection of Claims under 35 U.S.C. §103(a)

Claims 1, 4-5, 8, and 14-17 are rejected under 35 U.S.C. §103(a) over Perlak et al. (PNAS, 1991) in view of Joshi (Nuc. Acids Res., 1987).

Applicant respectfully disagrees.

However, purely to progress the prosecution of the application, Applicant has amended claim 1 to include all of the limitations of claims 10-12 which are not included in the rejection. As the remaining claims include all of the limitations of claim 1, they also cannot be obvious in view of the cited art. The rejection is overcome.

Claim 9 is rejected under 35 U.S.C. §103(a) over Perlak et al. in view of Joshi and Kozak. Claim 9 has been cancelled. The rejection is overcome.

Claims 10-12 are rejected under 35 U.S.C. §103(a) over Perlak et al. in view of Joshi further in view of Dancis (PNAS , 1991).

Applicant respectfully disagrees.

It is well-known that to establish a *prima facie* case of obviousness, three basic criteria must be met: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference(s) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaec*k, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143.

There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the cited references to make the claimed invention, nor is there a reasonable expectation of success. Accordingly, reconsideration and withdrawal of the rejection are requested.

Dancis et al. discloses that GT rich regions (TTTTTGCTCAYC) of FRE1 non-coding sequences were sufficient to confer iron-repressible transcription activity, but not teach to modify GT rich regions of FRE1 coding sequences. The GT rich regions of Dancis et al. were in the promoter elements, and confer iron-dependent regulation on expression of downstream reporter genes. However, the GT rich regions to be deleted of the present application are in the coding sequences of genes and serve as poly (A) signals. Therefore, the CT rich regions of Dancis at al- are functionally and completely different from that of the present application, Dancis at al. dose not teach anything to the present invention.

Perlak et al. teach that the modification of heterologous nucleic acids encoding Bacillus proteins increases the levels of these proteins. The Bacillus proteins confer insect resistance and have no role in iron assimilation. Further, the modification taught by Perlak is the alteration of a potential polyadenylation signal sequences which is 4 or more consecutive A or T without altering the amino acid sequence as described at "Modifications of the Coding Sequence of Insect Control Genes" in pages 3324 and 3325, which increases the G+C content as a matter of course. In other words, Perlak does not consider that GT rich sequence could be a polyadenylation signal in a combination of ATs. Perlak only discloses modification of prokaryotic organism gene crylA(b) and introduction into a plant. Specifically, ATTTA sequence or potential polyadenylation signal sequence (AATAAA or AATAAT) that were present in coding sequence of crylA(b) gene were modified, thereby resulting to increase G+C content and plant preferred codons and not to generate 6 or more consecutive A+T or G+C. However, it dose not disclose how to modify the yeast FRE1 gene, especially not teach to modify 8 or more consecutive nucleotide consisting of G and/or T.

Joshi at al. states that "certain domains of the 3' untranslated regions in forty-six nuclear genes of higher plants have been examined and search made for putative poly (A) signals" (lines 10-12, page 9629). Joshi also teaches that YGTGTTYY was found in the 50 bases downstream from AATAAA in Domain IV" (lines 3-24, page 9637). Joshi provides no teachings related to iron assimilation. Applicant notes that the sequence

taught by Joshi has only 5 consecutive G and/or T residues, not 8 as required in the instant claims. Moreover, Joshi requires a match of only 5 of 8 of the nucleotides which is clearly distinct from the instant claimed invention. Applicant assumes that Y is a pyrimidine. Therefore, the sequence of Joshi could be CGTAAACC, which would clearly not constitute a sequence consisting of ATTTA, NATAAA, ANTAAA, AANAAA, AATNAA, AATANA, or AATAAN of which N is A, G, C or T as claimed herein.

Joshi teaches that the sequences such as AATAAA, CAYTG, YGTGTTYY and YAYTG, known as a cis-acting poly (A) signal, in animal and virus were evaluated in relation to poly (A) sites of higher plants. However, it also indicates ***their probable non-involvement in the process of polyadenylaion in higher plants*** (see Abstract). Joshi also teaches that tobacco cells could not properly and efficiently recognize the animal and viral poly (A) signal (see page9637 below). Hence, Joshi does not teach the importance of GT rich regions such as CAYTG, YGTGTTYY and YAYTG in polyadenylation of higher plants or rather be negative to involvement in the GT rich regions. One of ordinary skill in the art would not have been motivated to delete intentionally these sequences to introduce a heterologous nucleic acid into a plant as if given Joshi's teaches. The present application discloses that the modified refrel genes having sequences such as CAYTG (i.e. CACTG or CATTG) and YAYTG (CACTG, TACTG or CATTG) were indeed expressed with highly efficiency in the transformed plants. Therefore, Joshi does not teaches sequences to be deleted for expressing heterologous nucleic acid as described in the present invention.

Neither Perlak nor Joshi teach anything about transforming a plant cell with a nucleic acid involved in iron assimilation. Dancis teaches the cloning of the FRE1 gene in yeast *Saccharomyces cerevisiae* and the DNA sequences that regulate its expression by iron. Dancis discloses that GT rich regions (TTTTTGCTCAYC) of FRE1 non-coding sequences were sufficient to confer iron-repressible transcription activity, but does not teach the modification of GT rich regions of FRE1 coding sequences. The GT rich regions of Dancis were in the promoter elements, and conferred iron-dependent regulation on expression of downstream reporter genes. However, the GT rich regions

to be deleted of the present application are in the coding sequences of genes and serve as poly (A) signals. Therefore, the CT rich regions of Dancis at al- are functionally and completely different from that of the present application, Dancis at al. dose not teach anything to the present invention.

There are no teachings or suggestions regarding plants or other organisms that would benefit from expression of FRE1. Further, the first paragraph of the Background of Dancis teaches that different organisms have different ways to assimilate iron from the environment, and that FRE1 is one part of an at least two part system. Therefore, it is not clear from the Dancis reference what other organisms could benefit from one half of a two part system for iron assimilation, particularly a part that was demonstrated to be dispensable to iron utilization in yeast (see end of paragraph 1). Dancis teaches nothing about expression of yeast iron assimilation genes in heterologous organisms. There can be no motivation to combine the references other than by use of impermissible hindsight.

The rationale to support a conclusion that the claim would have been obvious is that "a person of ordinary skill in the art would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success." *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006).

Applicant submits that there is not teaching or suggestions in any of the references to modify yeast FRE1 for expression in plants based on the cited references. Further, based on the teachings of Dancis that multiple iron assimilation mechanisms exist, there would be no expectation that incorporation of a portion of the yeast iron assimilation machinery into plants would be useful. Withdrawal of the rejection is respectfully requested.

In view of the above amendments and remarks, Applicant believes the pending application is in condition for immediate allowance.

FEE AUTHORIZATION

The Commissioner is hereby authorized to charge Deposit Account 04-1105, Reference 55022DIV(71526) the fee for extension of time for reply, one month. It is not believed that no further fee is due with this response. However, if a fee further fee is due, the Commissioner is authorized to charge any other fees associated with this submission to Deposit Account, No. 04-1105, Reference 55022DIV(71526). Any overpayment should be credited to said Deposit Account.

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Respectfully submitted,

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